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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Masakazu Koizumi

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EXAMINER

GODENSCHWAGER, PETER F

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/533,910	Applicant(s) KOIZUMI ET AL.	
	Examiner PETER F. GODENSCHWAGER	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5,8 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5,8 and 11-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 27, 2010 has been entered.

Applicant's reply filed April 27, 2010 has been fully considered. Claim 5 is amended, claims 15 and 16 are new, and claims 5, 8, and 11-16 are pending.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 5 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taya (US Pat. No. 5,026,523) in view of Vercammen (US Pat. No. 7,279,089).

Taya teaches a method of inhibiting corrosion in a boiler (steam generating unit) comprising providing/preparing an aminodiol corrosion inhibiting compound, and adding it to boiler feed water (operating steam generating unit) at a concentration of 0.1 to 500 mg/L (1:45-6; 3:30-40). Taya further teaches that the anticorrosive compound can be dissolved to readily raise

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the pH of the feed water to a satisfactory level in order to prevent corrosion in the boiler (1:50-60).

Taya does not teach the concentration range of anticorrosive of 0.4 to 4 mg/L of feed water or a pH range of 8.5-9.5, however, in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists (see MPEP 2144.05). In addition, it is common practice in the art to optimize result effective variables such as the pH range of the feed water and the concentration of anticorrosive added to boiler feed water (both of which are closely related according to Taya (1:50-60) (see MPEP 2144.05). At the time of the invention, a person of ordinary skill in the art would have found it obvious to optimize the concentration of anticorrosive compound added to the feed water, and also therefore the pH of the feed water, and would have been motivated to do so to optimize the effectiveness of the corrosion prevention (1:50-60; 3:45-65).

Taya does not teach that the amine is an amine of general formula (1) of claim 5 or specifically (β -hydroxyethyl) trimethylammonium hydroxide. However, Vercammen teaches the use of choline, (β -hydroxyethyl) trimethylammonium hydroxide, a compound of general formula (1) where R^1 , R^2 , and R^3 are methyl groups (hydrocarbon radicals with 1 carbon atom) and $n=2$, as a corrosion inhibitor for metals (1:9-23 and 2:63-3:15). Taya and Vercammen are analogous art because they are concerned with solving a problem of similar technical difficulty, namely the prevention of corrosion of metal surfaces by the quenching of corrosive acids with amines. At the time of the invention, a person of ordinary skill in the art would have found it obvious to use the choline of Vercammen with the method of Taya and would have been motivated to do so because Vercammen teaches that while other amines form a sticky solid when quenching acids

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which further lower the pH of the system, choline (the additive) does not, thus preventing secondary corrosion by amine-acid by products (2:35-50; 3:25-31). While neither Taya nor Vercammen explicitly teach that the method prevents formation of hydrogen chloride, the references render obvious all of the claimed ingredients, process steps and process conditions. Therefore, the claimed result would inherently be achieved by the method as claimed and rendered obvious. If it is the applicant's position that this would not be the case: (1) evidence would need to be presented to support applicant's position; and (2) it would be the Office's position that the application contains inadequate disclosure that there is no teaching as to how to obtain the claimed properties with only the claimed ingredients, process steps and process conditions.

Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US Pat. No 5,965,785) in view of Vercammen (US Pat. No. 7,279,089).

Braden et al. teaches a process of adding amines to a liquid (that contains water) that comes in contact with an atmospheric pipestill tower (atmospheric distillation column) in an amount to keep the bulk water condensate (which condenses at the top of the distillation column) at a pH of 5.5-6.5 (1:14-24, 2:10-25, 3:17-25, and 5:3-12). Braden et al. further teaches that the process prevents/inhibits corrosion (7:65-67).

Braden et al. does not teach the method where a compound of formula (1) or specifically (β -hydroxyethyl) trimethylammonium hydroxide is added in place of the amines (i.e. only a compound of formula (1) is added). However, Vercammen teaches the use of choline, (β -hydroxyethyl) trimethylammonium hydroxide, a compound of general formula (1) where R^1 , R^2 ,

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and R^3 are methyl groups (hydrocarbon radicals with 1 carbon atom) and $n=2$, as a corrosion inhibitor for metals in oil refinery systems (1:9-23 and 2:63-3:10). Braden et al. and Vercammen are analogous art because they are concerned with the same field of endeavor, namely the prevention of corrosion in oil refinery process through the addition of amines. At the time of the invention, a person of ordinary skill in the art would have found it obvious to use the choline of Vercammen to replace the amines in the method of Braden et al. and would have been motivated to do so because Vercammen teaches that while other amines form a sticky solid when quenching acids which further lower the pH of the system, choline (the additive) does not, thus preventing secondary corrosion by amine-acid by products (2:35-50; 3:25-31). While neither Braden et al. nor Vercammen explicitly teach that the method prevents formation of hydrogen chloride, the references render obvious all of the claimed ingredients, process steps and process conditions. Therefore, the claimed result would inherently be achieved by the method as claimed and rendered obvious. If it is the applicant's position that this would not be the case: (1) evidence would need to be presented to support applicant's position; and (2) it would be the Office's position that the application contains inadequate disclosure that there is no teaching as to how to obtain the claimed properties with only the claimed ingredients, process steps and process conditions.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US Pat. No 5,965,785) in view of Vercammen (US Pat. No. 7,279,089).

Regarding Claim 11: Braden et al. teaches a process of adding amines to a liquid (that contains water) that comes in contact with an atmospheric pipestill tower (atmospheric

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distillation column) where the amine may be added to the crude oil coming into the tower (which is after the desalter, see Fig. 1) (Fig. 1, 1:14-24, 2:10-25, 4:66-5:12). Braden et al. further teaches that the process prevents/inhibits corrosion (7:65-67).

Braden et al. does not teach the method where (β -hydroxyethyl) trimethylammonium hydroxide is added in place of the amines (i.e. only (β -hydroxyethyl) trimethylammonium hydroxide is added). However, Vercammen teaches the use of choline ((β -hydroxyethyl) trimethylammonium hydroxide), as a corrosion inhibitor for metals in oil refinery systems (1:9-23 and 2:63-3:10). Braden et al. and Vercammen are analogous art because they are concerned with the same field of endeavor, namely the prevention of corrosion in oil refinery process through the addition of amines. At the time of the invention, a person of ordinary skill in the art would have found it obvious to use the choline of Vercammen to replace the amines in the method of Braden et al. and would have been motivated to do so because Vercammen teaches that while other amines form a sticky solid when quenching acids which further lower the pH of the system, choline (the additive) does not, thus preventing secondary corrosion by amine-acid by products (2:35-50; 3:25-31). While neither Braden et al. nor Vercammen explicitly teach that the method prevents formation of hydrogen chloride, the references render obvious all of the claimed ingredients, process steps and process conditions. Therefore, the claimed result would inherently be achieved by the method as claimed and rendered obvious. If it is the applicant's position that this would not be the case: (1) evidence would need to be presented to support applicant's position; and (2) it would be the Office's position that the application contains inadequate disclosure that there is no teaching as to how to obtain the claimed properties with only the claimed ingredients, process steps and process conditions.

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Regarding Claim 12: Braden et al. does not teach the method where the amine is kept at 0.1-5 times the amount of salt content in the oil. However, it is common practice in the art to optimize result effective variables such as relative concentration of amine to salt in the crude oil distilling process (See MPEP 2144.05). At the time of the invention, a person of ordinary skill in the art would have found it obvious to optimize the relative amount of amine to salt in the crude oil distillation process and would be motivated to do so because, as Braden et al. teaches, the salt is directly responsible for producing the corrosive acid in the process (2:21-26). Therefore, based on the level of corrosion resistance required, one would want to adjust the acid quenching compound (amine) accordingly.

Regarding Claims 13 and 14: Braden et al. further teach measuring the pH of the condensate (condensed water) and adjusting the amount of amine accordingly (6:43-58). Braden et al. specify a pH range for the water condensate of the overhead accumulator of 5-6.5 as being corrosion safe (6:53-58).

Response to Arguments

Applicant's arguments with respect to claim 5 and 15 and the newly added amendment that the steam generating unit is "operating" have been considered and sufficiently responded to in the new grounds of rejection above.

Applicant's arguments filed April 27, 2020 regarding claims 8 and 11-16, specifically regarding the claim of unexpected results, have been fully considered but they are not persuasive.

Applicant argues that the data in the specification demonstrates unexpected advantages of the invention set forth in claims 5, 8, and 11-16. Applicant argues that Table 2 on page 32 of the

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specification shows that the presently claimed quaternary ammonium compound, choline ((β -hydroxyethyl) trimethylammonium hydroxide), can neutralize boiler water efficiently with an unexpectedly smaller quantity of the compound when compared to other amines. However, choline is described by Vercammen as a strong base (3:10-15). Table 2 compares choline, a strong base, to four weak bases, in their ability to raise the pH of an aqueous solution. It would not be unexpected to anyone of ordinary skill in the art that a strong base will raise the pH of an aqueous solution more than a weak base. This is exactly what defines a strong base relative to a weak base.

Applicant argues that Tables 3 and 5 on page 34 and 36 respectively of the specification demonstrate that the choline ((β -hydroxyethyl) trimethylammonium hydroxide) exhibits an unexpectedly superior lower corrosion speed than ammonia and other amines and exhibits an unexpectedly superior hydrogen chloride formation inhibiting effect or hydrogen chloride neutralizing effect compared to monoethanol amine or dimethylethanol amine. However, as set forth above, Vercammen already teaches that choline does not form a sticky, white, acidic solid when quenching acids that further lowers the pH of the system as compared to other amines (2:35-45; 3:25-30). As it is acidic corrosion that all references presently cited are interested in preventing, it is not unexpected that a compound that prevents acidic by products is more effective at preventing corrosion than amines that are disclosed to produce acidic by products. This is exactly the issue that Vercammen seeks to address with the use of choline ((β -hydroxyethyl) trimethylammonium hydroxide) (see 2:25-65 and 3:25-30 of Vercammen). Vercammen also teaches that regular amine-HCl salts can dissociate to amine and HCl causing corrosion, whereas the method of Vercammen aims to prevent such problems (see 2:25-65 and

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3:25-30 of Vercammen). Therefore, it is not unexpected that the use of choline ((β -hydroxyethyl) trimethylammonium hydroxide) results in lower corrosion and more effective neutralization of hydrogen chloride.

Applicant argues that Test Example 4 on page 39 and the chart in Fig. 3 of the specification demonstrate the unexpected advantages of the presently claimed invention. Applicant argues that the data shows that the presently claimed invention unexpectedly prevents secondary corrosion as the chlorine salt of the presently claimed quaternary ammonium compound is thermally decomposed, there is no formation of hydrogen chloride. However, as set forth above, Vercammen already teaches that regular amine-HCl salts can dissociate (and thermally decompose) to amine and HCl causing corrosion, whereas the method of Vercammen aims to prevent such problems (see 2:25-65 and 3:25-30 of Vercammen). Therefore, it is not unexpected that the use of choline ((β -hydroxyethyl) trimethylammonium hydroxide) results in lower corrosion and more effective neutralization of hydrogen chloride. Vercammen specifically seeks to avoid secondary corrosion by amine-chloride salts formed with regular amines by instead using choline ((β -hydroxyethyl) trimethylammonium hydroxide) (see 2:25-65 and 3:25-30 of Vercammen). Therefore it is not unexpected that choline ((β -hydroxyethyl) trimethylammonium hydroxide) reduces secondary corrosion in comparison to regular amines.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PETER F. GODENSCHWAGER whose telephone number is (571)270-3302. The examiner can normally be reached on Monday-Friday 7:30-5:00 EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Eashoo can be reached on (571) 272-1197. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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